

## Section 1010

### Fence and Guard Rail

**1010.01 BARBED WIRE.** Comply with the "Buy America Provisions" in 106.04.

Barbed wire shall be either steel or aluminum alloy and shall be 12 1/2 gage.

**1010.01.1 Steel Barbed Wire.** Comply with ASTM A121.

**1010.01.2 Aluminum Alloy Barbed Wire.** Comply with ASTM B211, Alloy 5052-O for line wire and Alloy 5052-H38 for barbs.

**1010.02 WOVEN WIRE.** Comply with one of the following Design Numbers and Grades of ASTM A116.

<u>Design No.</u>	<u>Grade</u>
939-6-11	60
939-6-12 1/2	60
939-6-14 1/2	125
939-6-12 1/2	125

**1010.03 POSTS AND BRACES FOR FIELD AND LINE TYPE FENCE.** Posts and braces shall be either steel or treated timber.

**1010.03.1 Treated Timber Posts and Braces:** Posts shall be round. Braces shall be either round or square. Comply with Section 1014.

**1010.03.2 Steel Posts and Braces:** Steel posts and braces shall be equipped with corrugations, knobs, notches, holes, or studs so placed and constructed as to engage a substantial number of fence wires in proper position. Posts may be punched with holes in such position and of such size as will not unduly impair the strength of the posts. Posts with punched tabs used for fastening wires are not acceptable. Corner, end, and bracing posts shall be supplied with necessary holes and with galvanized bolts of standard commercial quality or other satisfactory substitute, such as castings, for fastening braces to the posts.

Line posts, anchor plates, and braces shall comply with ASTM A702, except that a hardness test may not be substituted for the tensile test. Steel posts, anchor plates, and braces shall be galvanized in accordance with ASTM A123.

**1010.04 STAPLES AND NAILS.** Staples and nails shall be made of galvanized steel wire. Minimum galvanized coating shall be not less than 0.20 ounce per square foot when tested in accordance with ASTM A90.

**1010.05 METAL FASTENERS FOR STEEL POSTS.** Metal fasteners for steel posts shall be galvanized steel-wire fasteners or clamps and shall be satisfactory for use with the type of steel post furnished. Wire shall be not less than 0.120 inch diameter. Galvanized coating shall not be less than 0.20 ounce per square foot when tested in accordance with ASTM A90.

**1010.06 GATES FOR FIELD AND LINE TYPE FENCE.**

**1010.06.1 Gates:** Steel used in fabricating gates shall be galvanized in accordance with ASTM A653 Coating Designation G60.

**1010.06.2 Posts:**

**1010.06.2.1 Treated Timber:** Comply with Section 1014.

**1010.06.2.2 Metal:** Metal posts shall be made of galvanized steel pipe, standard weight, complying with ASTM A53.

**1010.06.3 Hardware:** Hinges, washers, nails, staples, welded chains, and latches shall be galvanized, of acceptable quality, and of satisfactory type for use with the gate and posts selected.

**1010.06.4 Gate Stops:**

**1010.06.4.1 Treated Timber:** Gate stops shall be timber complying with 1010.03.1 treated in the same manner as posts.

**1010.06.4.2 Metal:** Gate stops shall be acceptable galvanized steel suitable for welding to the post.

**1010.06.5 Stop Posts:** Stop posts for double swinging driveway gates shall be treated timber complying with Section 1014.

**1010.07 CHAIN LINK FENCE, GATES AND APPURTENANCES.**

Comply with AASHTO M 181 except for the following.

Wire ties, fabric ties, hog rings, and tension wire for Type I, II, or III fencing shall be aluminum alloy, galvanized ductile steel, or aluminum-coated ductile steel wire.

**1010.07.1 Wire Ties:** Wire ties, fabric ties, and hog rings shall have 20,000 psi minimum tensile strength, and 10 percent minimum elongation. Steel shall be coated with at least 0.60 ounce of zinc or 0.40 ounce of aluminum alloy per square foot of uncoated wire surface. Wire ties shall be AWG No. 9. Fabric ties and hog rings shall be AWG No. 12.

**1010.07.2 Tension Wire:** Galvanized and aluminum-coated steel tension wire shall be AWG No. 9 wire having at least 75,000 psi tensile strength with at least 0.70 ounce of zinc or 0.40 ounce of aluminum alloy per square foot of uncoated wire surface.

Aluminum alloy tension wire shall be AWG No. 6 wire having at least 42,000 psi tensile strength, 35,000 psi yield strength, and 10 percent elongation.

Barbed wire used with chain link fence shall comply with 1010.01.

Padlocks shall be solid jacket, extruded brass metal with interchangeable cores and 1 3/4-inches cases. All padlocks shall be keyed alike. Furnish two keys for each padlock.

**1010.08 GROUNDING.** Ground rod assemblies suitable for grounding fences and other applicable grounding requirements shall meet the following requirements:

**1010.08.1 Ground Rods:** Ground rods shall be a minimum 5/8 inch nominal diameter copper weld steel rod with a minimum length of 8 feet.

**1010.08.2 Ground Wire:** Ground wire shall be an AWG No. 6 solid copper conductor firmly attached in such a manner that fence fabric, barbed wire, metal post and ground rod are electrically connected.

**1010.08.3 Mechanical Connectors:** Mechanical connectors will only be allowed where exothermic welds cannot be achieved. Mechanical connectors for attaching ground wire to ground rods is not allowed. Mechanical connectors for attaching ground wire to fence fabric, barbed wire and metal posts shall be solid copper alloy UL approved. Coated steel hardware will not be permitted.

**1010.09 METAL BEAM FOR HIGHWAY GUARD RAIL.** Rail elements shall be corrugated sheet steel beams from the Approved Materials List. Guard rail elements, terminal sections, and fittings shall be interchangeable with similar parts, regardless of source or manufacturer.

Guard rail, terminal sections, and appurtenances shall comply with AASHTO M 180 and the DOTD standard plans.

The fabricator shall annually file a Brand Registration and Guarantee with the DOTD Materials Engineer Administrator.

**1010.10 GUARD RAIL POSTS AND BLOCKOUTS.** Railing posts shall be either timber or steel. Furnish the same kind of posts on a structure. Furnish timber post blockouts or an approved alternate material that is approved by the Federal Highway Administration and also complies with

NCHRP 350 or the latest edition of the AASHTO Manual for Assessing Safety Hardware (MASH).

**1010.10.1 Timber Posts and Blockouts:** Timber and preservative treatment shall comply with Section 1014.

**1010.10.2 Steel Posts:**

Comply with AASHTO M 270, Grade 36 galvanized in accordance with ASTM A123. Furnish Certificates of Analysis (Mill Test Reports) together with a Fabricator's Material Statement and Certificate of Compliance in accordance with 1013.01. Field welding is not allowed unless specifically required by the plans.

**1010.10.3 Guard Rail Attachments:**

Concrete for guard rail attachments shall comply with Section 901 Class A1. Reinforcement shall comply with Section 1009.

**1010.11 GUARD RAIL HARDWARE.** For non-proprietary systems and components bolts shall comply with ASTM A307, Grade A and nuts shall comply with ASTM A563, Grade A (Property Class 5). Washers shall comply with ANSI B18.22 for regular Type B series.

Fittings, bolts, washers, and other accessories for steel guard rail shall be galvanized after fabrication in accordance with Section 811.

**1010.12 WIRE ROPE AND FITTINGS FOR HIGHWAY GUARD RAIL.** Comply with AASHTO M 30.